BITCOIN PRICE MOVEMENTS USING PROBABILITIES

Warren R Hughes – March 2022

Current developments in the Ukraine may have added to Bitcoins's (BTC) viability. Cutting off a country's access to the world financial system makes existing alternatives more attractive. Below we examine the possibilities for a BTC move in price over the next 2 – 6 months. A probabilistic framework is adopted. Possibilities ordered from least to most likely are as follows:

- $-10^{+}\%$ Loss in value greater than 10% (Loss).
- $+20^{+}\%$ Major gain in value exceeding 20% (M Gain).
- $\pm 10^{-}\%$ Minor moves around the current price of less than 10% (SQ or status quo).
- $+10^{+}\%$ Gain in value between 10% and 20% (Gain).

Pairwise values are now estimated and shown in Table 1. These show that SQ is between 2 and 3 times "more likely" than M Gain. In turn. Gain is between 40% and 80% "more likely" than SQ. Different decision-makers (DM's) will have different judgments. Those in Table 1 are illustrative.

Table 1

Possible Pairwise Values for the Four Events on the BTC Price

	Likelihood	Pairwise Values	
EVENT	**Ratio**	**Low**	**High**
Loss	Base	1.00	1.00
M Gain	M Gain/Loss	1.50	2.50
SQ	SQ/M Gain	2.00	3.00
Gain	Gain/SQ	1.40	1.80

Using the spreadsheet ANAPA4.xlsx and the above judgments, $2^{(4-1)}$ or 8 distributions are calculated as in Table 2.

Table 2

Resulting Probability Distributions Over the Four Events for the BTC Pairwise Values in Table 1

	Candidate Probability Distributions from BTC Pairwise Judgments							
Event	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Loss	0.1031	0.0918	0.0752	0.0662	0.0645	0.0571	0.0465	0.0408
M Gain	0.1546	0.1376	0.1128	0.0994	0.1613	0.1429	0.1163	0.1021
SQ	0.3093	0.2752	0.3383	0.2980	0.3226	0.2857	0.3488	0.3061
Gain	0.4330	0.4954	0.4737	0.5364	0.4516	0.5143	0.4884	0.5510
SUM	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**

Distribution 1 uses the Low pairwise values in Table 1 and distribution 8 uses the High values. Some values in Table 2 have been rounded to satisfy the sum-to-unity axiom. In Table 3 summary statistics on the candidate distributions are outlined. Average is an average of the Mean, Median and Midpoint values. Spread shows the difference between the minimum and maximum probabilities for that event over all distributions. Average spread shows an 8% difference for the probabilities. This gives some leeway for the DM to alter the Average probabilities to make use of information other than the pairwise values in Table 1. To illustrate, the Percent column in Table 3 shows the FINAL

probabilities as determined in this case. Note that the 5% for Loss is within the spread of 4% to 10% for the Loss event.

Table 3

Statistics on the Candidate Probability Distributions in Table 2 for the 4 BTC Events

	Probabilities		Range Statistics				Probabilities		More Likely Value
Event	Mean	Median	Low	High	Midpoint	Spread	Average	Percent	
Loss	0.0681	0.0654	0.0408	0.1031	0.0720	0.0623	0.0685	5	1.00
M Gain	0.1284	0.1270	0.0993	0.1613	0.1303	0.0620	0.1285	15	3.00
SQ	0.3105	0.3077	0.2752	0.3488	0.3120	0.0736	0.3101	30	2.00
Gain	0.4930	0.4919	0.4330	0.5510	0.4920	0.1180	0.4923	50	1.67
SUM	**1.0000**	**0.9920**	**0.8483**	**1.1642**	**1.0063**	**0.3159**	**0.9994**	**100**	
			Average Spread = 0.0790						

The Percent column shows the final judgments of the DM in this illustration. The More Likely Value for the M Gain/Loss ratio at 3.0 is outside the original Table 1 High value of 2.50, but this is of no real consequence. The initial pairwise judgments are necessarily vague and/or tentative. The DM could decide that Loss is at most a 5% chance with M Gain going to 15%. Both these probabilities are within the spread over all candidate distributions for the respective events. A significant BTC price gain is then a 65% chance in the DM's final illustrative judgment.

Word count 624, 9th March 2022.